



Fabricate Pieces to Complete a Defective Jigsaw Puzzle

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TOOLS:

- [Computer running Windows \(1\)](#)
[Any version of Windows that comes with Microsoft Paint will suffice for this project.](#)



PARTS:

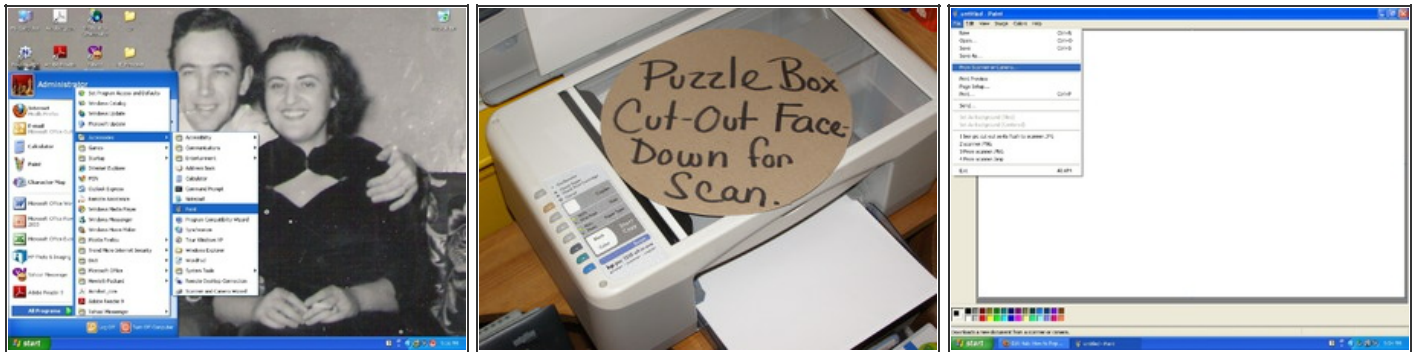
- [3-in-1 Printer, Scanner, Copier \(1\)](#)

SUMMARY

What you'll need to begin:

THE BOX in which your puzzle came (hopefully, with a picture of the completed puzzle on it); A typical **3-in-1 style printer-scanner-copier** (with ink, of course); **Photo paper** (I'd use gloss finish, depending on the puzzle); **Microsoft Paint** (which is on virtually every computer, new or old, running Windows); A **FINE POINT pen** (to make it easier to outline, you might just pull the cartridge out of the shell of the pen); A **scissors**; A piece of **CARDBOARD** (thickness also depending upon the puzzle); **Krazy Glue** (brush-on is probably the easiest to use); An **X-ACTO knife**.

Step 1 — Opening and Scanning from Microsoft Paint



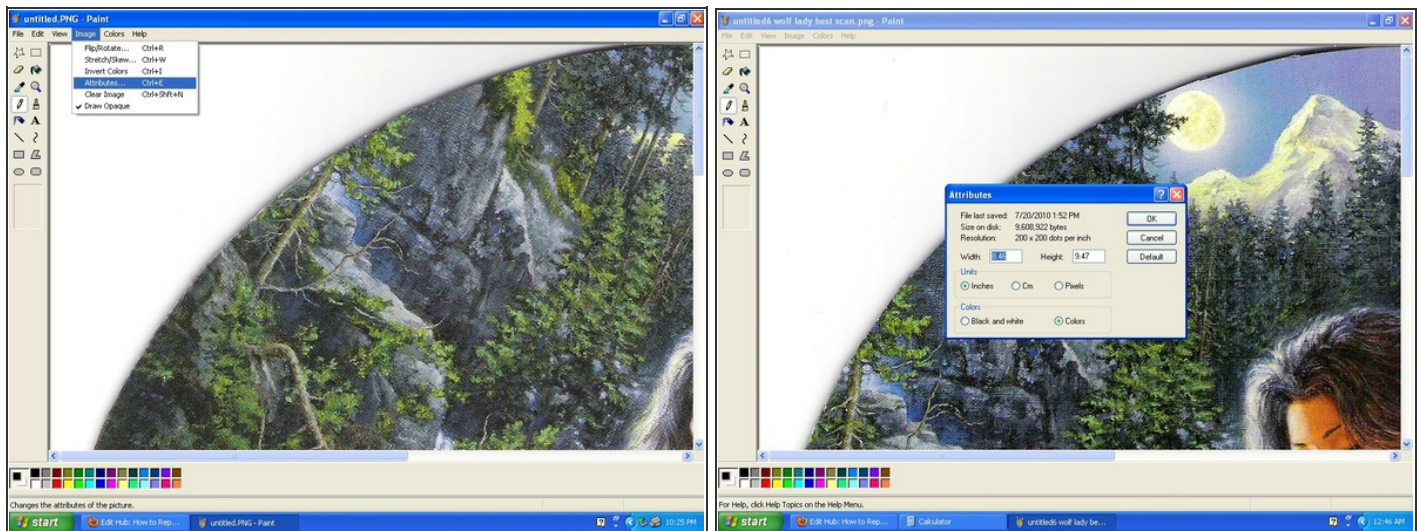
- If you're running *Windows*, you can access **Microsoft Paint** through the **START** button: either by selecting **Accessories**; or by entering **mspaint.exe** in the **RUN** command window.
- Turn on your 3-in-1 device, and place a good picture of the completed puzzle (from the box presumably) on its scanning surface. **It doesn't really matter if you get the entire image of the puzzle in your scan; but rather, that you successfully copy the area you need to duplicate pieces from.** Most likely, you're going to start out with a scan image that is **PROPORTIONATE**, but also smaller than the actual completed puzzle. Do try to get as much of the image as you possibly can (it'll make things easier later).
- Once in **Paint**: go to **FILE**, and select **"From Scanner or Camera."** This will pop-up a smaller window with a button that says **"Scan"**. Select to scan; and then wait for the image to completely visualize on screen.

Step 2 — Scanning and Cropping your Puzzle Box



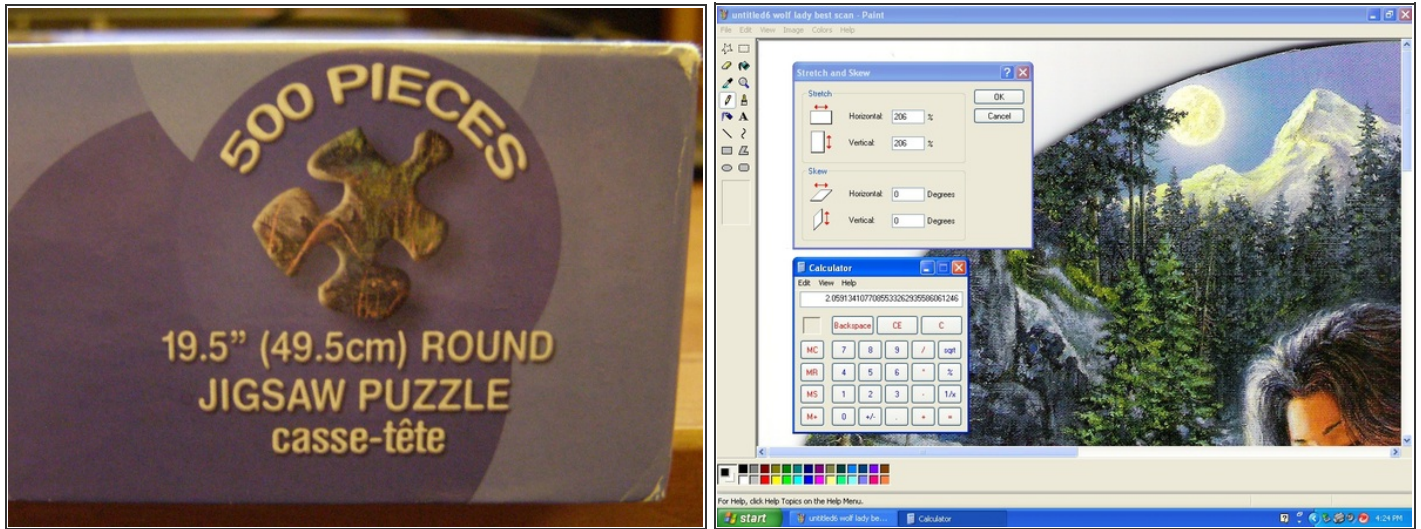
- A preview of the scan of your puzzle box will appear in the open window, after you press the **"Preview"** button. If you need to **CROP** your image, look for the squares on the edge of the dash-lines that appear around the image; and then simply drag these to cut off everything but the puzzle.
- In the example: you can see that I had a circular puzzle; and in fact, part of the box image was also just a tad too big for the scan surface to capture entirely. Again, what is more important really, is that you get a good scan of the area of the puzzle that you need to duplicate (in my case, it was the woman's knee). **Even still, I cropped my scan to just the edge of the puzzle, as best I could.**
- Likely, your puzzle box image is small by comparison; which means, you're going to need to **ENLARGE** the scanned image you create. Before we accomplish this though, let's make sure everything remains **proportionate**, in the next step...

Step 3 — Measurement via the Attributes Tool



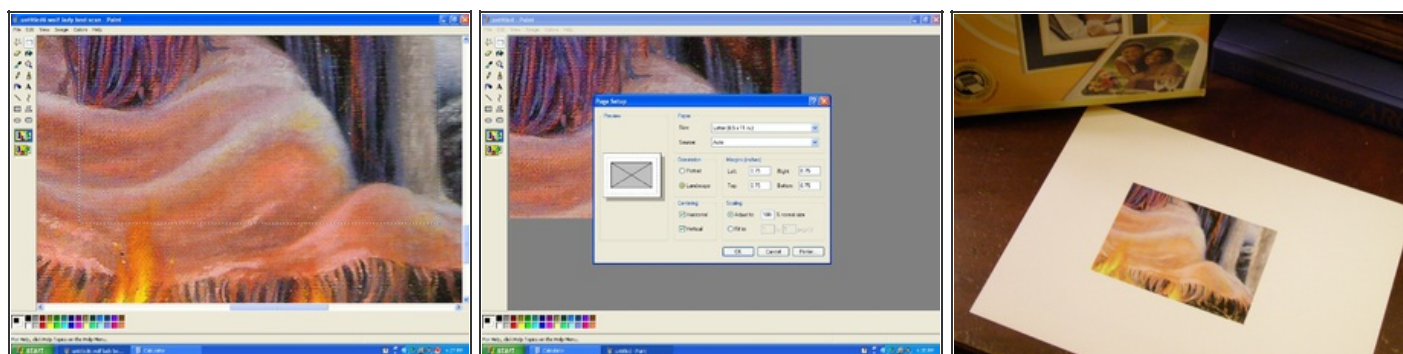
- A nifty feature that comes as part of the *Paint* program, is the **"Attributes"** tool, found under the **IMAGE** menu. Selecting this will give precise measures of your scan, in any of three units (inches, centimeters, or pixels, if you prefer).
- Again, in my example: note that the my **"width"** and **"height"** dimensions ought to match (because it's a circular puzzle, and ought to have a diameter equal to either measurement), though they do not. This is simply on account of my box image being larger than the scan surface of my 3-in-1. And as such: **I need to account for the missing area, before I can go any further.** MEASURE the dimensions of your box image with a RULER, if necessary.
- If need be also, in your own case: **entering a number in either "width" or "height" will simply extend the area of the scan without distorting the picture.** A blank white area will then appear in place of any missing part of the scan image. **Do this to match the real-life dimensions of your puzzle box image.**
- Once again: the result is likely a smaller image; but only now at least it is **proportionate** to the full-scale puzzle. You are now ready to dilate the image, in the next step...

Step 4 — Making a Proportionate Image of Equal Size



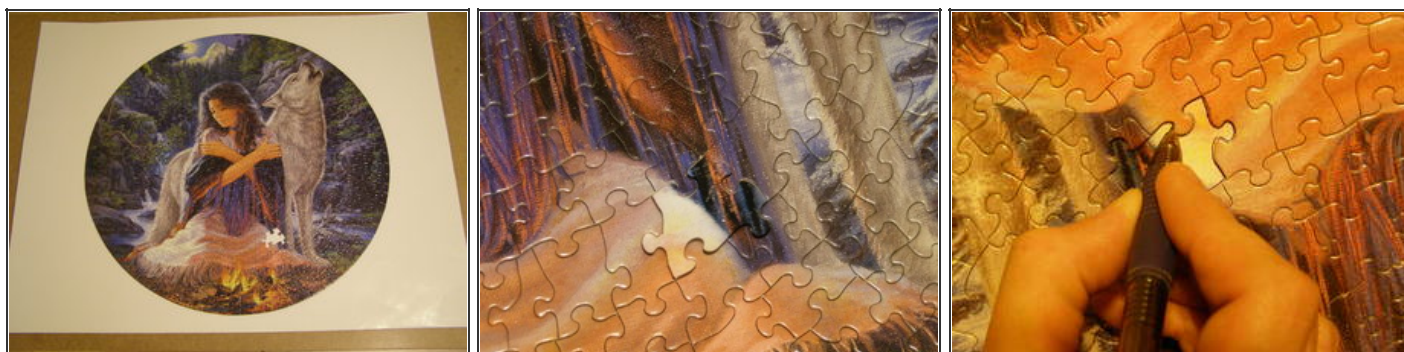
- Make a note of the actual dimensions of the completed puzzle (usually found on the front or side of the box). Then, go back to the **IMAGE** menu on the task bar, and select **"Stretch and Skew."**
- In the entry fields for **"Horizontal"** and **"Vertical"**, you can enter a number either larger than 100%, or smaller (100% being the size of the image, as it currently appears on screen; and a number either greater or lesser than 100, enlarging or reducing its size, respectively). **Determining what percentage to enter requires a little math...**
- My puzzle, for example, ought to be = **19.5 inches** across. However, my scan is only = **9.47 inches** across so the scan image obviously has to be enlarged! **DIVIDING** these two numbers (the **ACTUAL PUZZLE Dimension** ÷ the **SCAN IMAGE Dimension**) provides us with a useful **RATIO**.
- **Mathematically speaking:** a ratio can be expressed as a decimal number; which, in turn, can be expressed as a percentage. So the scheme is: convert our **RATIO** to a **DECIMAL** to a **PERCENTAGE**.
- **TO ENLARGE THE SCAN:** the greater number is written on top in the ratio (which is the same as the larger number being entered into a calculator 1st)... **19.5 / 9.47** **19.5 ÷ 9.47 = 2.0591341077085533262935586061246**. Or **≈ 2.06** **206%**.
- So that means, in my case, I have to plug the number **206**, in each of the **"Stretch"** entry fields for **"Horizontal"** and **"Vertical"** %. Doing so will enlarge my scan image to match the actual dimensions of the completed puzzle. Yay! :)
- **If instead, you need to reduce the scan size:** the greater number would be written as the bottom of the ratio (which is same as that number being entered into a calculator 2nd); and then divided as before. **Once you have your decimal figure, always move your decimal point TWICE to the right** (which is the same as multiplying by 100, to form a percent). Round to the nearest whole percent.

Step 5 — Precision Printing to Save Ink



- Now, **rather than waste ink or printer paper**: scroll over to the area you need to make a puzzle piece from. **Select the cutting icon from the *Paint* tools (along the left side of the screen), and proceed to chop out the area that you want in particular.**
- Then: go up to **FILE** again; open a **"New" Paint** window; and **paste this section from the old window into the new one.**
- To see if the image now fits on a single page, before printing: under **"FILE"** select **"Print Preview"**. If it makes a better fit for printing: change the print area from **"Portrait"** to **"Landscape"** style; or try narrowing the area again with the cutting tool. To change the print settings (from portrait to landscape), choose **"Page Setup"**, and select either setting from the pop-up window.
- Depending on the puzzle, you might print in either **matte** or **gloss finish**. Remember, of course, to load your printer tray with at least one page of either type of photo paper--and then print!

Step 6 — Tracing a New Piece



- Once you've printed: **place the photo print beneath the hole in your puzzle; and then try to align the two, by judging from the pattern.**
- Next, carefully **trace** the outer edge of the hole in your puzzle, onto the underlying photo print.

Step 7 — Fabrication, Part I: Gluing



- To save glue (which is also an eye irritant): **I cut down the photo area to just a simple square**, slightly larger than the outline of my puzzle hole.
- I **next cut out a slightly larger square of cardboard**. You can use corrugated cardboard, like I did; but if you can find a thick enough piece of scrap cardstock-esque cardboard, I would use that instead (it makes cutting less arduous).
- Just to avoid the possibility of getting glued fingers, **you might choose to wear some rubber gloves from this point onward.** :)
- Finally: **apply quick drying, clear adhesive to the back of the photo paper; and then press it to the cardboard.** I prefer **brush-on Krazy Glue** for this purpose.

Step 8 — Fabrication, Part II: Cutting



- The last step is a little tedious. But generally, the more time you take, the better the outcome. Using an *X-acto* knife: **carefully trace the outline of the missing puzzle piece, repeatedly; until you've pierced through each later of material, all the way around.** TAKE YOUR TIME!
- Invariably, some of the photo ink will chip while cutting. So, **to better blend your homemade piece within your completed puzzle: you might just dab a felt tip marker along the edges;** using a similar color, or several if necessary.

Step 9 — Results!



- Here are results from two different puzzles I've done. In the second example, there were actually two pieces missing from the manufacturer. Fortunately, they were adjacent; so I just made one large piece to replace them both.

You can do it! :)

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